
BULLETIN

of the

Chicago Herpetological Society



Volume 35, Number 1
January 2000



BULLETIN OF THE CHICAGO HERPETOLOGICAL SOCIETY

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Fall Survey of the Brazos Water Snake, *Nerodia harteri harteri*, and Other Snakes on the Brazos River, Palo Pinto County, Texas, with Notes on the Survival of a Captive-born Neonate

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A three-day search along an 11-mile stretch of the Brazos River in north-central Texas was conducted 24–26 October 1999, to determine the relative abundance of the Brazos water snake, *Nerodia harteri harteri*. The survey was performed by overturning rocks and visually examining all emergent vegetation and wood along the river’s edge. This section of the river is the same section examined in a previous survey in July 1999 (Rossi and Rossi, 1999).

The weather was clear with daytime high temperatures ranging from 29.4 to 31°C (85–88°F). Nighttime low temperatures during the study ranged from 12.2 to 17.7°C (54–64°F) during the study. Sun-warmed rocks along the river’s edge often exceeded 32.2°C (90°F). The water temperature was 17.7°C (64°F) except in shallow, slow moving areas where it was considerably higher. Humidity was low (20–30%) and barometric pressure was above 30” during this study. The water level was at the lowest level that we have seen it this year, with many more rocks exposed than normal.

Six species of snakes were observed under rocks, swimming in the open, or basking on snags during the three-day search. These included the Brazos water snake, *Nerodia harteri harteri*, blotched water snake, *N. erythrogaster transversa*, diamondback water snake, *N. rhombifer*, western ribbon snake, *Thamnophis proximus proximus*, rough earth snake, *Virginia striatula*, and the Great Plains rat snake, *Elaphe emoryi*. The snakes were captured when possible, measured, weighed, sexed, and in many cases, had oral bacterial cultures

taken. Oral culture results will be reported in a separate paper.

It is important to note that two of the Brazos water snakes were found under rocks in an isolated area and were similar in size. These juveniles were probably born in August and were most likely siblings. The third Brazos water snake was born on 28 July 1999 in captivity in Jacksonville, Florida. It was released on 4 August 1999 near the site of capture. Based upon the size and weight of this snake, it appeared to have adapted well and was comparable to wild neonates of approximately the same age. This snake had quadrupled its body weight and grown 15.9 cm in length. This is a growth rate of 5.3 cm/mo (2.1 in/mo).

Interestingly, only four Brazos water snakes have been found by us on the river this year. One was an adult female found in July (Rossi and Rossi, 1999); two were the neonates just described; and one was a captive-born released animal. This represents a marked reduction in the number of Brazos water snakes normally observed; in years past, four snakes might be found in less than half an hour, instead of eight days.

The cause of this apparent reduction in the numbers of this threatened species is unknown; however, habitat destruction and increased distance between suitable habitats are considered the primary causes. With slower, deeper water, the larger, slower, heavy bodied water snakes may also be increasing in number, thereby competing with the Brazos water snakes, a species normally considered adapted to faster moving water

Table 1. Snakes found along the Brazos River, Palo Pinto County, Texas, 24–26 October 1999.

Species	Sex	Snout–vent length (cm)	Total length (cm)	Weight (g)	Estimated Age
<i>Nerodia harteri harteri</i>	M	28.3	38.7	16	3 months*
	F	25.4	33.0	12	3 months
	F	27.9	35.6	15	3 months
<i>Nerodia rhombifer</i>	F	25.4	31.8	19	3 months
	F	90.2	111.8	1003	4 years
	—	—	—	—	2 years
<i>Nerodia erythrogaster transversa</i>	—	—	—	—	1½–2 years
	—	—	—	—	1½–2 years
<i>Thamnophis proximus proximus</i>	M	39.4	55.9	19	1 year
	F	29.2	35.6	7	3 months
	F	49.5	69.9	33	3 years
	M	28.6	40.6	7	3 months
<i>Virginia striatula</i>	F	—	10.0	1	3 months
<i>Elaphe emoryi</i>	F	35.6	43.2	17	3 months

* Captive-born snake, released on 4 August 1999 by Texas Parks and Wildlife.

with many riffle areas.

It is too early to conclude that the Brazos water snake is in imminent danger of extinction. Certainly, this late in October, many of the adult and subadult snakes may have moved to hibernacula. However, this is the third survey in 1999 that revealed very low numbers of snakes, when compared to previous years, and also compared to the numbers of other snake species. It is our opinion that the federal government should re-evaluate the status of this species. Federal protection in the form of funds to conduct further research would be very helpful. It is our belief that relatively little help in the form of habitat enhancement would be extremely effective in helping to save this species. This would include the creation of more hiding areas by the addition of large rocks in shallow water areas, as well as clearing some of the vegetation in other areas to expose rocks that have been buried by siltation.

Establishing some continuous habitat rather than widely isolated pockets of habitat would be extremely valuable in terms of saving any species, and this species is no exception. Furthermore, water flow rates from the Possum Kingdom Dam could be adjusted at critical times of the year in order to increase survival rates. If the species is severely threatened, biologists might even consider harvesting some of the invading generalists that might be competing with this species until the habitat is somewhat restored. Certainly, over the course of this year, we found large numbers of juvenile blotched and diamondback watersnakes occupying the same rocky areas where juvenile Brazos water snakes used to be found.

The contribution of captive breeding to the preservation of this species is a real, though limited possibility. A detailed discussion of the breeding facility and comparison of captive vs. wild snakes is presented in Rossi and Rossi (in prep.).

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Bull. Chicago Herp. Soc. 35(1):2, 2000

Kuma the Rattlesnake-Killing Canid: A Stochastic Analysis

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Having acquired a two-volume set of Klauber's (1956) *Rattlesnakes* that once belonged to and was inscribed to Chapman Grant, we were happy to discover a letter from Klauber tucked into the pages of Volume 1. That missive is reprinted here for the entertainment of the membership of CHS. The only comments we will add here are (1) that upon exhaustive search, no trace has been found of Klauber's references; (2) inasmuch as Klauber was fond of using sliderules, the very slight errors in his figures are quite understandable; (3) the final conclusion probably holds in spite of these problems with references and computational details; and (4) the author possessed a mischievous sense of humor never evident in his scientific writing.

"San Diego, July 22, 1961

My dear Major Grant:

I am in receipt of your inquiry as to the truth of the story that the dog Kuma destroyed 7 rattlesnakes one year, and 12 + ditto in the following year. Fortunately this is a statement that

readily lends itself to statistical analysis.

An enormous accumulation of data¹ has shown that the chance that any particular snake story is true is 1 in 37.481. A similar survey² with respect to dogs indicated that the corresponding figure is 1 in 24.384. Therefore the composite or combined chance that the above story is true is the product of these two probabilities, or 1 in 913.9359. It is therefore obvious that the dog killed .0064 rattlesnake the first year and .0114 rattlesnake the second year, or a total of .0178 rattlesnakes in two years. This means that Kuma would probably have killed a rattler if he had kept at it for 112 years.

Yourne
Laurie

P.S. Dogs, especially big, long-haired ones, whose hair affords considerable protection, do become rather skilled rattler killers. See *Rattlesnakes*, p. 1042-1044.

¹Prink: *Ann. an. ann.*, 26-33, pp. 904-1161, 1887.

²Schremmelmusik: *Propt. Zell, Ft.*, v. 46, n. 7, pp. 1-61, 1894."

A Wonderful Frog from Vietnam: Biology, Management and Breeding

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A good many frogs that are striking for their shapes, color, or various adaptations belong to the family Rhacophoridae, though it includes only a few genera. However, in my opinion the most wonderful are the frogs of the genus *Theloderma*, which are as yet quite unknown to terrarium keepers. Today the genus includes ten recognized species, though the possibility cannot be excluded that at least one more species from Vietnam will be described in the near future. The genus is common in Southeast Asia, from southern China southwards; its members are encountered in well-preserved mountain forests. During expeditions to Vietnam over several years, five species of these amphibians were observed; all of them lead an extremely secluded life, inhabiting water-filled cavities, mainly hollows in tree-trunks. However, *Theloderma corticale*, which lives in karst zones of northern Vietnam, occupies flooded caves and deep niches in the banks of mountain streams.

We first found this species in 1995 near the settlement of Tam-Dao, 90 km from Hanoi. At a height of about 1,000 m above sea level, substantial areas of forest still survive thanks to the extremely steep slopes; in places the forest comes up to the ruins of old French colonial villas, destroyed as long ago as the 1950s. The ruins are situated not far from a small artificial water basin where the main population of the warty newt, *Paramesotriton deloustali*, is known to have lived until very recently. (Unfortunately, when constructing a hotel on the bank in 1997, the builders discharged construction waste, probably containing lime, into the basin; as a result, all the aquatic animals there, including *P. deloustali*, were lost.) At the edge of the forest we found two ruins overgrown with trees and shrubs, which in our opinion represented an ideal dwelling



A specimen of *Theloderma corticale*, showing the extraordinarily warty skin.

place for various amphibians and reptiles. When we surveyed them we found that all that survived of one of them, which stood close to a rocky cliff, were some remains of the walls, heavily covered with moss and lichen. A concrete water-filled basin was situated in permanent shade in the corner formed by the wall and the rock. Low trees grew together over the basin, and it was dark there even by day. A great number of foam nests of the bamboo tree frog (*Polypedates leucomystax*), which is a common species there, hung over the basin, and thousands of their larvae swam in the water over a thick layer of drowned leaves. Frog larvae of another species, which were darker and larger, were also found on closer examination, and, after a time, adult *Theloderma corticale*, first identified as *T. leporosa*, came to the surface. Two pairs of these amphibians inhabited the basin, which measured about 2 m × 1 m and 50 cm deep. They behaved very cautiously, sitting in the water with only their heads above the surface; when they sensed any danger, they immediately hid on the bottom and buried themselves in the leaves, so that we had to wait for their return. Clusters of five or six eggs, contained in a mucilaginous envelope and attached to the wall two or three cm above the water surface, were found in the corners of the basin.

The other building was much better preserved: in places basement rooms, absolutely lifeless and quite dark, remained intact, though their floors were covered with wet sand. However, when we worked our way through a half-blocked passage into one of the rooms, we found that it, being much lower than the others, was filled with clean water. This two-meter-deep underground pool covered an area of about three meters by five; its bottom was covered with fragments of brick and concrete. About a hundred frog larvae were swimming in the clear water. Two pairs of adult *Theloderma corticale* were caught there, though because of the great volume, depth and cluttering up of the bottom, it took us some nights to catch the amphibians.

The frogs were about 8–9 cm long, with the males being somewhat smaller and markedly thinner than the females. In color and texture, their skin looks like a bunch of moss: the green skin, with black spots and stains, is provided with numerous tubercles and spines, making it quite impossible to see a frog when it is sitting still. People who are not expecting to encounter such perfect cryptic coloration can look at a *T. corticale* and never see it, even in a terrarium.

To our great regret, we could not save alive the group of frogs we caught in 1995, and another adult pair of frogs, brought back by a subsequent expedition, only arrived in the



A pair of *Theلودerma corticale* in amplexus, with eggs hanging above.

terrarium in May 1996. By that time the old ruins, which had served as the breeding site when we visited it in 1995, had been destroyed as the settlement expanded. The new pair were caught on the bank of the stream in a small water-filled karst cave, where egg clusters and tadpoles were observed. Later, in 1997, two more large caves, inhabited by relatively numerous specimens of this species, were found.

During the earlier period, the frogs were kept in a wet terrarium, 50 × 40 × 30 cm in size, at a temperature of 26–30°C by day and 22–24°C by night. A water-filled tray was used as a water basin, containing no substrate. The frogs actively ate large insects (crickets, cockroaches) and seemed to be quite comfortable. By day they hid behind the tray, leaving this shelter to hunt with the advent of darkness. In August 1996, they were transferred to an aqua-terrarium, 80 × 45 × 40 cm in size, with the water level being about 8 cm. Ceramic pots and fragments were used as a bank and shelters. The temperature was raised by 1°C on average, and the light period lasted 12 hours. The frogs spent almost all their time in the water, concealing themselves in the shelters. They tried not to leave the water basin even to hunt: they kept only their eyes and nostrils above the surface when they were waiting for prey. Two weeks later the male began to call by night, uttering melodious staccato sounds, resembling the cries of the fire-bellied toad (*Bombina*). Whenever a person approached the terrarium, the male dived immediately, and would not resume its calling at all that night. It should be noted that all the species of *Theلودerma* held in our collection are characterized by extreme shyness, so that it is difficult to watch them during their active period. Despite the evident activity of the male, breeding failed to take place as quickly as we had hoped, so in September the pair were transferred to a larger aqua-terrarium (150 × 40 × 60 cm), imitating their natural habitat: half the area was occupied by land, with coarse gravel used as a substrate, and the other half by a 15-cm deep water basin with good filtration and aeration. A great quantity of ceramic pots, fragments of calcareous stone and pottery crocks were used as shelters. In addition, a large *Anubias lanceolatum* (Araceae) was planted in the water. In preparation for wintering the temperature was first reduced to 23–26°C by day and 20–22°C by night. It is known that in the natural habitat of the species



A close-up view of some eggs of *Theلودerma corticale*.

the temperature drops to 4 or 5°C in winter; but, not to take the risk of losing our single pair, we decided to arrange a milder wintering, and in early October the temperature was lowered to 18–20°C by day and 13–15°C by night. The frogs decreased their activity, and almost ceased to move and eat; however, they did not leave the water basin. Wintering continued to the end of October, when the temperature was raised to 24–26°C by day and 18–20°C by night. In the evenings the vivarium was sprayed with warm water. Soon the male started calling all night long.

Initially the female did not respond to the male's song, though she fed eagerly and left the water to hunt at night. Starting in mid-November, however, she began to react when she heard the voice of the male, getting onto the stones and uttering low cries. Several amplexuses were observed, though these lasted only a short time. Then, on 28 November, a long amplexus took place, and at 6.00 A.M. on 29 November the pair started spawning; the process lasted about three hours. The female, with the male sitting on her back, climbed up the plant, bent over and attached light grey eggs, about 5 mm across, to the stems 5 to 7 cm above the water. When one to five eggs were attached, the pair went into the water again, and resumed the process 15 to 30 minutes later. Most of the eggs dropped into the water in the process of spawning, and only the five last spawned remained on the plant. In all 37 eggs, covered with a thick, mucilaginous, transparent and very sticky envelope, were spawned. After spawning the amplexus broke up and the frogs hid in the water as usual, occupying their habitual shelters.

The eggs were left in place for incubation, and the temperature in the terrarium was raised to 24–26°C. The eggs that remained in the air became black in color, and grey frog larvae were distinctly seen as early as the third day. By days 11 to 13 of their development, the larvae became black, and on days 13 to 15 four frog larvae, about 15 mm long, broke through the envelope and dropped into the water.

The envelopes of the eggs which had fallen into the water swelled greatly after several hours, reaching a size of 20 mm across; the eggs did not darken, and next day they became lighter in color and perished. However, it turned out later that

Theloderma corticale spawn can be incubated in water, if it is aerated to the maximum possible extent. Curiously, in this case the frog larvae, though kept at the same temperature as those in the air, hatch from the eggs on days 7 to 9, when they have not yet acquired black coloration and when they are only half the size.

Thereafter spawning took place every seven to 14 days till 13 February 1997, and the eggs were mostly spawned above water on the stones and crocks. The number of eggs in a clutch varied from 11 to 37. The clutches were carefully transferred onto ceramic crocks and moved into a 25-cm deep aquarium, 150 × 40 × 40 cm in size, and attached in such a position that they were washed by the water though being for the most part in the air.

During the first day after hatching, the frog larvae “hang” motionless at the water surface, and later on start swimming. Curiously, they do not eat during the first week—at least, I did not succeed in observing the process. When they begin to eat, they readily feed on protein-based food—meat, fish, liver, boiled eggs. Vitamin-rich foodstuff produced for aquarium fish by Tetra GmbH was fed to them at regular intervals. For the better comfort and development of the larvae, the water should always be clean and well aerated. *T. corticale* larvae feel comfortable in a relatively deep water basin, so the desirable water level is no less than 20 cm. The temperature should be from 24 to 26°C. At lower temperatures the larvae become less active, mostly lie on the bottom and refuse to eat. By day 50 of their development, the larvae reach 60 mm in length and their hind legs become visible. After day 75, the hind legs begin to move, and the black, smooth skin on their back becomes dark green and tubercular. The first young frog completed its development on day 91, and the longest period of metamorphosis observed lasted about six months. When the young amphibians leave the water they are 20 to 23 mm long and have short tails, which completely disappear in five to seven days. When put in an aqua-terrarium, the young frogs at

first spend much time on the walls and stones, but as they grow older they descend into the water. If kept at temperatures of 28°C by day and 20–22°C by night, young *T. corticale* start eating on days 8 to 15 and, when well fed with crickets, they grow up rapidly—for example, a one-month-old frog attains 30 to 35 mm in size. At three to four months old they return to the water, and leave it to hunt by night only. Six-month-old frogs are usually six or seven cm long; the males acquire pronounced breeding calluses and start calling. Of interest is the fact that *T. corticale* specimens reared in captivity are much brighter and more spectacular in color as compared to those who grow up in the wild.

While on the subject of *T. corticale*, I would like to remind readers of the problem of the forests of Southeast Asia. The areas of tropical forest which still survive there are probably doomed to be annihilated in the very near future. The extremely high level of endemism existing in the montane forests makes us regret the mass enthusiasm of terrarium keepers for popular species such as members of the genera *Lampropeltis* or *Dendrobates*. It should be borne in mind that the Asian species include some which deserve no less attention and need it much more.

Acknowledgments

I would like to thank my friends and colleagues who have lent invaluable assistance and brought back from expeditions very rare animals whose biology is still unknown and who are already threatened. I would also like to acknowledge those who have helped me to find necessary literature, who have made brilliant comments, or who have simply given moral support in our hard times. I am especially grateful to Professor I. Darevsky, N. Ananieva (Head of the Laboratory of Ornithology and Herpetology, Zoological Institute, Russian Academy of Sciences), N. Orlov (research worker at the above-mentioned laboratory), and S. Ryabov (Director of Tula Exotarium).

Reading list

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**Book Review: *A Key to Amphibians and Reptiles of the Continental United States and Canada*
by Robert Powell, Joseph T. Collins and Errol D. Hooper, Jr. 1998.
University Press of Kansas, Lawrence, KS. 131 + 5 unnumbered pp. 257 b/w line illus. \$17.95.**

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This key provides a much needed, long overdue addition to the herpetological literature of the continental United States and Canada. Profusely well illustrated (257 b/w line drawings), this volume is a welcome aid for identifying specimens, particularly for college students. It is also of much use for professional zoologists who may not be familiar with a certain group or area of the country.

The keys use the standard couplet method, which begins by taking you to the major group of animals (Amphibians-Reptiles) and then to the subgroups. The various subgroups lead you to the genera contained in the group. If the genus is monotypic then the genus is listed followed by the species involved. If more than one species is involved in the genus then a set of couplets leads you through to the species. In some cases there may be more than one path through the couplets that may bring you to the correct identification. No subspecies are included. Various genera and species sometimes have S, CC or CAAR listed and this is explained in the introduction. In some cases the couplet may have some geographic range associated with it to aid in its identification. Some identifications have a small note (fine print) pointing out special problems or other things.

Established introduced species are included in the keys. Older keys are far outdated in this respect. With the proliferation of introduced species, especially in Florida, this is a very welcome addition. Marine species are included such as the

various sea turtles and the sea snake, *Pelamis platurus*, which touch our shores. The species that do not recognize our political southern border and are found on both sides are included as United States even if their main range is in Mexico.

Some taxa normally considered subspecies by some workers are listed as full species in the key, following the phylogenetic species concept. This controversial concept is a bone of contention in this work for some investigators.

Not enough can be said for the b/w line illustrations. They are numerous and excellent and in a big way aid in pointing out some key characters for various genera and species; especially for the audience for whom this book is intended. The illustrations in themselves are worth the price of the book.

The glossary of terms not in everyday vocabulary goes a long way in aiding in the use of the keys. The literature cited is adequate although this reviewer feels that other recent publications (state faunas) could have been included.

This book exceeds the expectations of a key and is one that I thoroughly recommend for the level for which it is intended and also for the professional working in the United States and Canada or working on material from this area in other countries. A single error was found on page 67, couplet 11a. Polychrotidae (p. 00) should be (p. 88). This 131+ page softcover book is a bargain at today's prices for a book of this quality.

Bull. Chicago Herp. Soc. 35(1):6-8, 1999

HerPET-POURRI
by Ellin Beltz

Weblings

- "Since we cannot ever get enough of reptiles, check out the lizard sitting on the passport on the new *Jobaria* website: <www.jobaria.org>." Lori King-Nava
- Mike Rapley sends this URL which is supposed to show "the future in snake reproduction": <<http://www.spacedaily.com/spacecast/news/robot-991.html>>.
- Don't forget to visit the *Jobaria* pair and *Afrovenator* on Navy Pier from January 14 through March 19, 2000. It's open every day and it's free. For more information, call (312) 595-5043 or <<http://www.navypier.com>>. [from Kevin Goldman, via E-mail]

Lost, found, stolen and strayed

- Hammond, Louisiana, police had "to contend with a hissing, writhing 6-foot Burmese python after a 9-year-old boy found it in a driveway under the family car." The father said, "My son came in the house and said there was a snake under the car. I thought he meant an itty-bitty thing. Imagine my surprise." [Houma, LA *Courier*, November 5, 1999, from Ernie Liner]
- Officials in Lihue, Kauai, Hawaii, have abandoned their search for a large snake spotted in the Wailua River and described to "mimic Loch Ness sightings." To those of us on the mainland, all this fuss would at first seem silly season reporting, but to snake-free Hawaiian islands, the possibility of a large constrictor or voracious predator like the brown tree

snake, could sound the death-knell for hundreds—if not thousands—of native species. One Boat Tour worker said he saw a 20-foot snake crawling up a tree. Then a pair of kayakers saw it. Then the crew of a motor boat service company saw something they reported as looking like “a hump in the water.” Local residents are suggesting that it might be an abandoned or lost pet anaconda. [*Honolulu Advertiser*, November 3, 1999, from Sean McKeown]

- Early fall flooding in Villahermosa, Mexico, sent waves of crocodiles into the streets of that beleaguered town, adding to the muddy woe and misery of its embattled residents. Officials captured nine crocs in flooded areas adjacent to public parks and population. The Red Cross said that five people had also been bitten by snakes, but all were treated quickly and will recover. [Houma, *LA Courier*, October 16, 1999, from Ernie Liner]

This story had legs

As a Barbados pet shop owner tried to pass customs at Miami International Airport, he stated that he had nothing to declare. Alert customs agents noticed that the man’s pants were wiggling and that there were bulges in odd places—also wiggling—and searched him. They found 55 red-footed tortoises stuffed between the two pairs of pants the man was wearing. He was charged with smuggling and also transporting an endangered species, which is a treaty violation. [December 5, 1999, Houma, *LA Courier*, from Ernie Liner; *Chicago Tribune*, from Claus R. Sutor; Eureka, CA *Times-Standard* from Bradford Norman; *The News-Star*, from Martha Ann Messinger]

Alone again, naturally

The December 17, 1999 *Los Angeles Times* reports: “A [33-year-old] woman who kept a menagerie of poisonous snakes, piranhas and other exotic animals in her . . . trailer was found dead after apparently being bitten by a rare African [gaboony] viper. . . . [She] was discovered . . . in her living room in a fetal position with two puncture wounds on the back of her hand . . . clutching a note that read ‘Northridge hospital ask for ICU.’ . . . Family members said [the woman] . . . had long tried to get a job at the L.A. Zoo. ‘She was really an expert in snake handling, said her mother . . . [and her sister said,] ‘She thought she was immune to the venom at this point in her life.’ [A member] of the Southwestern Herpetologists Society in Los Angeles said [that the woman] had been bitten at least six times by her rattlesnakes. [He added that] two months ago [the woman] brought a gaboon viper from Texas, [and added,] ‘The minute I found out about it, I told her to get rid of it. I told her many times [that] it’s deadly.’ [from Wes von Papi-neäü <<http://www.latimes.com/news/state/19991217/t000114920.html>>] For those considering handling venomous animals, please notice that a very important part of the venomous protocol did not happen here. Laszlo’s rules state “Never Handle Venomous Animals Alone.” It so often seems that envenomations become more serious when this rule is violated. Just recently there have been another handful of bites of herpetologists home (or in lab) alone. Do the Nancy; just say No to solo snakehandling (venomous or not). We need all our members alive and well in 2000!

Judge closes Pacific

Kathy Bricker writes: “This is exceptionally good news for anyone who cares about sea turtles, sharks, albatross, and the myriad other creatures killed accidentally on Hawaiian longlines! This victory gives us all one more blessing to celebrate this . . . Thanksgiving!” November 23, 1999 via E-mail. The press release reads: “Court closes large area of the Pacific to the longline fishery to save endangered sea turtles. Hawaii federal district court Judge David A. Ezra today ordered thousands of square miles of the Pacific Ocean closed to the Hawaii-based longline fishery to reduce the longliners’ impacts on threatened and endangered sea turtles. The closure, which extends north of 28 degrees north latitude, east of 168 degrees west longitude, and west of 150 degrees west longitude, becomes effective within 30 days from today, and will remain in effect until an Environmental Impact Statement analyzing the fishery’s impacts is complete.” “For once we are taking a precautionary approach while we look for a permanent solution,” said Pam Plotkin, the Center for Marine Conservation’s Senior Conservation Scientist. “The judge’s decision may help save Pacific leatherback sea turtles from extinction.” According to Todd Steiner, director of the Sea Turtle Restoration Project, “This is exactly the action we needed to start us on a solid path to saving the critically endangered leatherback sea turtles. Commercial fishing activities must be conducted responsibly to protect marine biodiversity and eliminate the wasteful killing of these magnificent animals. Judge Ezra has ordered a temporary closure while additional research is conducted. Ultimately, we may need to create permanent marine protected areas, where fishing is not allowed, to ensure the survival of this ancient species.” The Sea Turtle Restoration Project and the Center for Marine Conservation, represented by Earthjustice Legal Defense Fund, had filed suit in February against the National Marine Fisheries Service and related government agencies challenging their failure to properly manage the longline fishery and comply with federal environmental laws. Judge Ezra had concluded, in an order issued October 18, 1999, that the government had violated the National Environmental Policy Act by failing to prepare an EIS for the longline fishery, and that a “carefully tailored” injunction was appropriate while the EIS process was ongoing. At that time, Judge Ezra requested briefs from the parties on how to craft an injunction that would balance the needs of the endangered species with the concerns of the longline industry, which intervened in the suit. The Court’s decision today was based on scientific data showing that the leatherback turtle is in imminent danger of extinction in the Pacific, and that the great majority of leatherbacks (as well as loggerhead turtles) caught by the Hawaii-based longliners are hooked by the largest longline vessels fishing for swordfish hundreds of miles north of the main Hawaiian islands. These vessels also account for much of the shark finning that occurs in the longline fishery, as well as the deaths each year of thousands of albatross that are hooked on longlines. Earthjustice attorney Paul Achitoff commented: “Judge Ezra’s order was compelled by the National Marine Fisheries Service’s persistent refusal to take any effective measures to save these endangered turtles from extinction. NMFS has stood by for years and watched as leatherback populations have plummeted. An Environmental Impact

Statement will finally expose the devastation being caused by the longline fishery. This injunction increases the chance that there will still be leatherbacks left in the Pacific by the time the EIS is finished.” Leatherbacks nest in Mexico and Costa Rica in the eastern Pacific, and, in the western Pacific, in Malaysia and Irian Jaya. Although in 1980 it was estimated that there were 126,000 adult female leatherbacks in the eastern Pacific alone, scientists estimate that there are less than 3,000 leatherbacks of both genders left in the eastern Pacific. The western Pacific nesting populations also have been devastated, and are near extinction.

Collins’ KAMP followers rewarded

In addition to the straight awards including “excellence in Kansas Herpetology,” and “Best Photograph of a Native Kansas Amphibian or Reptile” (all modestly named after the first family of Kansas Herpetology), “two other KHS meeting attendees were recognized as the first recipients of “The Big Croaker Awards,” sponsored by the Kansas Department of Wildlife and Parks and the Kansas Amphibian Monitoring Program, and given to those individuals who monitored choruses of frogs and toads with diligence and excellence during the spring of 1999. . . . Each spring, over 100 . . . volunteers census choruses of amphibians on eighty 15-mile routes across Kansas, establishing baseline information that will eventually be used to determine whether amphibian populations are declining, increasing, or remaining stable.” [News Release, Kansas Herpetological Society, November 14, 1999, via E-mail]

Viper your feet, first

The November 21 *Dallas Morning News* reports that Texas cattlemen and environmentalists are working together on a common cause, saving the Guadalupe River and Cagle’s map turtle. The threat is two proposed reservoirs that would flood “more than 500 farms” and 70 percent of turtle habitat along the river near Cuero, Texas. While the ranchers see the Endangered Species Act like “a rattlesnake imported to control rats,” the folks from the Center for Biological Diversity say they’ll work with the cattlemen now and sue them later to get the cows off the river. [*GreenLines* 1021, December 8, 1999, from Roger Featherstone]

Are we finis of what siecle, yet?

- “Please note the article posted today on a “Turtle farmer” on CNN’s Web site at: <<http://cnn.com/FOOD/news/9911/02/turtle.farmer.ap/index.html>? A quote: “[The man and his wife] buy turtles from commercial trappers. Soft-shell, snapping and painted turtles can legally be trapped in Iowa, where the[y] get most of their turtles. He bought about 189,000 pounds of live turtles this year, including more than 10,000 soft-shell turtles, which will be shipped live to restaurants and seafood retailers around the country. Painted turtles are sold as pets or for their shells.’ Somebody please remind me: What century is this?” Dave Galbraith [from James Harding, November 3, 1999, via E-mail]

- On a similar note, Ernie Liner sent along a piece from the Baton Rouge, Louisiana, *Sunday Advocate* titled “Nuisance

gators go in the pot.” In Luling, Louisiana, there’s a gator trapper in the sheriff’s office who is in charge of removing all gator pests in the parish and who just loves cooking up those nuisance gators later. He also owns the only alligator farm in the parish, but his gators have not grown to a size to harvest, yet. “A few years back, the federal government hired [him] to find some alligators which had made their home in a canal in Luling and were keeping a professional diver from his work on a pipeline. The diver . . . watched a cherry picker hoist an 11-footer from the water and into the back of the [hunter’s] pickup as passersby stopped to snap pictures of the animal suspended 30 feet above the ground.” Officials estimate that gators outnumber humans in the parish two to one. [September 26, 1999, from Ernie Liner]

If your parents don’t let you watch the news, skip this paragraph.

Lately around our local news here in Chicago have been a series of ads, which I suppose are an improvement over Bob Dole on a couch, but which my dyslexic ears mishear into one of the worst accidental puns ever to cross my feeble mind. Turning the pages of my CHS column file folder this month, I saw a photo of smiling pole vaulter Jeff Hartwig who “shows off . . . an 11-foot albino Burmese python [which is] one of 57 reptiles in Hartwig’s collection.” [from Bill Burnett *Arkansas Democrat Gazette*, August 8, 1999] Next clipping down is about “A business with bite,” and the photo shows the smiling man and his alligator farm down in Cut Off, Louisiana. The man keeps regular and albino alligators and has built up one of the most successful alligator farming operations in the south. [Houma, LA *Courier*, August 22, 1999] Another photo shows a late-middle-aged white guy showing off a 40-inch long cane-brake rattlesnake with two heads. The tail is in his left hand. Both heads are in his right hand. The man has taken care of the snake for four years after buying it for \$850 from a junk dealer who found it as a neonate after shooting the mother that had just given birth on the front seat of a junk car. Only the two-headed snake and his two-headed sliders are in the man’s portable attraction titled “Flukes of Nature.” [*The Times-Picayune*, October 30, 1999, both from Ernie Liner] Then I’d ask you to cast your mind back on all the newspaper photo reptile stories you’ve ever seen. . . . The man who loved lizards so much he had his name changed to “Iggy Iguana” . . . Men with 100s of tortoises in enclosures—some in distinctly too cold native lands. . . . Men with hundreds of snakes in sweater boxes at “swaps.” . . . Firemen giving mouth-to-mouth to a lizard. . . . Men with iguanas on their heads or boas wrapped like living jewelry parading around some warmer than here beach boardwalk. . . . Remember the ad? So this is the face of a reptile dysfunction!

With thanks to everyone who contributed! You can contribute, too. Letters only to E-mail (attachments just don’t come through!) and stuff from the print media by taking whole pages of newspaper/magazine and being sure that the publication and date slug and your name is on each piece. Mail to: Ellin Beltz, 1647 N. Clybourn Avenue, Chicago, IL 60614-5507.

Herpetology 2000

In this column the editorial staff presents short abstracts of herpetological articles we have found of interest. This is not an attempt to summarize all of the research papers being published; it is an attempt to increase the reader's awareness of what herpetologists have been doing and publishing. The editor assumes full responsibility for any errors or misleading statements.

GROWTH AND SEXUAL SIZE DIMORPHISM

G. P. Brown and P. J. Weatherhead [1999, Copeia (3):723-732] note that understanding the evolutionary basis for sexual size dimorphism (SSD) in a species first requires determining the extent to which observed SSD is a result of sex differences in growth or in size at maturity, as opposed to being a consequence of factors such as differential survival or catchability of the sexes. The authors used data from a nine-year study to assess how these factors contribute to female-biased SSD in *Nerodia sipedon* in eastern Ontario. Females grew substantially faster and larger than males, although both sexes approached their asymptotic size at the same rate. Smaller individuals of both sexes grew faster, and snakes grew faster in years with higher mean air temperatures during the activity season. Variation in growth rate was unrelated to relative fat content of individuals in the spring. No evidence was found that either the sex or size of individuals affected their probability of capture. However, comparisons of estimated ages of males and females, and a null growth-based analysis, both indicated that large, old males were overrepresented in capture samples, probably as a result of differential survival of males and females. The overrepresentation of large males caused the authors to slightly underestimate SSD caused by sex differences in growth. A comparison of sex-specific growth patterns in the study population of *N. sipedon* with those in two other *N. sipedon* populations suggests that intraspecific variation in SSD in this species may be primarily a consequence of differences between populations in selection pressures on males.

OZARK ZIGZAG SALAMANDER AGGRESSION

A. Mathis and E. Britzke [1999, Herpetologica 55(3):344-352] note that when animals differ visibly in competitive ability, contests are predicted to be settled quickly. They tested the hypotheses that body size and experience influence agonistic displays in contests between adult male Ozark zigzag salamanders, *Plethodon angusticlavius*. They paired males of either the same size (± 1 mm snout-vent length) or of different sizes (≥ 4 mm difference in length) and observed their behavior for 30 minutes. Both large and small males exhibited significantly more threat displays when paired with other males of the same size than when paired with males of different sizes, indicating an effect of relative body size. Absolute body size also influenced agonistic behavior; when tested against same-size opponents (symmetric contests), large salamanders were more aggressive than small salamanders. Recent experience influenced the behavior of small males but not of large males. Qualitatively, the highest levels of aggression were exhibited by large salamanders in symmetric contests and the lowest levels were by small salamanders with no recent experience that were in asymmetric contests. Thus, the factors influencing the level of aggression in a given contest may be complex, including relative body size, absolute body size, and experience.

ECOLOGICAL MORPHOLOGY OF CARIBBEAN ANOLES

K. Beuttell and J. B. Losos [1999, Herpetological Monographs 13:1-28] report that anoles have evolved independently on each island in the Greater Antilles, producing a suite of morphologically distinct species that utilize different microhabitats. Comparisons among islands indicate that the same set of "ecomorphs" — distantly related species that are similar in morphology, ecology, and behavior — has evolved on each island. Despite considerable work on anoles over the past three decades, much remains to be learned about evolution of the ecomorphs. In particular, previous studies have focused on external measurements of gross limb proportions, tail length, mass, and number of lamellae. Using a variety of techniques, the authors examined these characters in greater detail and investigated a wide variety of other characters. They found that the ecomorph classes represent distinct entities in morphological space when morphological characters are examined in greater detail (e.g., each limb element was treated separately). In addition, they found that the ecomorphs differ in a variety of characters not previously examined, including toe pad area, pectoral and pelvic girdle dimensions, head dimensions, and tail shape. These differences were apparent regardless of how body size was defined, although comparisons of particular characters were affected by which body size variable was used. This finding indicates that convergence in ecomorph evolution extends beyond traits directly linked to habitat use and locomotion. The authors also examined a number of other taxa that have not traditionally been considered to be members of any ecomorph class. They found that many descendants of ecomorphs living on small islands near the Greater Antilles no longer belong to the ecomorph class of their ancestor. Many Lesser Antillean anoles appear to be trunk-crown anoles, whereas others do not belong to any ecomorph class. Montane anoles of the Greater Antilles and *Chamaeleonops* also do not belong to any ecomorph class, but *Chamaeleolis* and possibly *Phenacosaurus*, are twig anoles.

STATUS OF *HYLA ALBOLINEATA*

R. Sachsse et al. [1999, Herpetologica 55(3):401-406] note that *Hyla albolineata* is a green treefrog from Teresópolis, Rio de Janeiro state, in the Atlantic rainforest of Southeastern Brazil, known previously from only two young specimens. Additional field work at and near the type locality resulted in the collection of four adult males and a brooding female, which gave birth to 16 froglets that she was incubating in a dorsal pouch. Based on this pouch, a synapomorphy of *Gastrotheca*, the species is treated in this paper as *Gastrotheca albolineata* comb. nov. It is a medium-sized species within the genus (snout-vent length to 60 mm) and seems most closely allied to the species complex synonymized with *Gastrotheca microdiscus*.

TAXONOMY, DISTRIBUTION AND CONSERVATION OF *MANTELLA* FROGS

M. Vences et al. [1999, Alytes (1-2):2-72] review the taxonomy, distribution and conservation of the Malagasy poison frogs in the genus *Mantella*. Based on bioacoustic, morphological, osteological and color characters, they recognize 17 species in six groups: (1) the *M. betsileo* group (including *M. betsileo*, *M. viridis*, *M. expectata*, *M. manery* [new species described in this paper], and a still undescribed species); (2) the monotypic *M. laevigata* group; (3) the *M. cowani* group (including *M. cowani*, *M. baroni*, *M. aff. baroni* [a distinct morph, whose taxonomic status is unresolved], *M. heraldmeiri*, and *M. nigricans*); (4) the monotypic *M. bernhardi* group; (5) the *M. madagascariensis* group (*M. madagascariensis* and *M. pulchra*); and (6) the *M. aurantiaca* group (including *M. aurantiaca*, *M. mylotympanum*, and *M. crocea*). Keys to the species, photographs of individual frogs, and distribution maps are provided in this monograph.

Although *M. madagascariensis* and *M. baroni* appear to be very similar in dorsal coloration, the authors found that these were distinct species. The syntype series of *M. cowani nigricans* was found to be heterogeneous, and contained *M. laevigata* specimens as well. The authors designated a lectotype for *M. c. nigricans*, and elevated that taxon to specific rank as *M. nigricans*. Lectotypes of other taxa recognized as valid (*M. cowani*, *M. aurantiaca*, *M. betsileo*, and *M. mylotympanum*) and questionable (*M. attemsi* and *M. aurantiaca rubra*) are also designated by the authors. The authors note that, due to the popularity of this genus with hobbyists, a number of “phantom” scientific names with no type specimen cited have been introduced into the popular literature. This has led to extensive nomenclatural problems. Due to the current rules governing zoological names, the unfortunate result of some of these creations has been to make them nomenclaturally available. Among the phantom names found by the authors were the conditional names *M. “mysteriosa,” M. “marojezy,” M. “marojezi,” M. “negristata.”* The name *M. nasuta* was a nomen nudum, and is no longer available. The name *M. aurantiaca rubra* is considered by the authors to represent a synonym of *M. aurantiaca*. On the other hand, the authors found that *M. aurantica mylotympanum* (another name introduced in hobbyist literature without type material) was distinct, and they elevate it to specific status as *M. mylotympanum*. Finally, the authors use species distribution, habitat status, trade intensity, and attractiveness in the pet trade to subjectively assess the current conservation status of the recognized *Mantella* species. They classify as “not threatened” only one species (*M. betsileo*). Five species (*M. laevigata*, *M. nigricans*, *M. baroni*, *M. pulchra*, and *M. madagascariensis*) are classified as “commercially threatened — at least locally.” The authors consider four species (*M. viridis*, *M. expectata*, *M. heraldmeiri* and *M. cowani*) to be “rare,” and two others (*M. aurantiaca* and *M. bernhardi*) to be “vulnerable.” Three *Mantella* (an undescribed species, a distinct morph currently considered *M. aff. baroni*, and the new species, *M. manery*) are considered to be insufficiently known to determine their conservation status, and two (*M. mylotympanum* and *M. crocea*) are known from single localities and are of “indetermi-

nate” status. Research needs that would be useful to the conservation of this genus are also identified.

[abstracted by Michael Redmer]

PATTERNS OF STRIKING IN BOOID SNAKES

D. Cundall and A. Deufel [1999, Copeia (4):868-883] found that striking is kinematically variable in booid snakes but generally fits one of three patterns. Analysis of slow speed, short-exposure video records of more than 200 strikes in 17 juveniles and subadults of seven species of booids shows that they first hit the prey either with the mandibles (MAN strikes) or with the mandibles and upper jaw together [driving scissors (DSC) strikes], rarely with the upper jaw [palatamaxillary (PMX) strikes]. In MAN strikes, inertia carries the braincase over the prey in an arc whose radius is partly defined by the tip of the mandible. In DSC strikes, both jaws slide over the prey. In both of these strike patterns, much of the impact of prey contact appears to be directed through the mandibles and their suspensoria and adductor muscles. Ventral flexion of the whole head and neck initiates the first constricting coil shortly after contact with the prey and may be aided by reaction forces generated by the prey's inertia. In PMX strikes, on the other hand, the braincase incurs a higher proportion of impact forces and ventral flexion of the head is often delayed. The predominant use of MAN and DSC strikes suggests that these kinematic patterns in combination with tooth geometry may reduce the probability of tooth breakage at the time of jaw impact with the prey. The same tooth geometry increases the probability of snaring in the interval between contact and immobilization by constriction.

FRILLNECK LIZARD DEMOGRAPHY AND HOME RANGE

A. D. Griffiths [1999, Copeia (4):1089-1096] examined the demography and home range of a population of frillneck lizards, *Chlamydosaurus kingii*, from 1992 to 1994, in Kakadu National Park, Northern Territory, Australia. Lizards were studied using radiotelemetry and mark-recapture techniques. Reproduction occurred between November and April each year, coinciding with monsoonal conditions. Reproductive activity was highest in the first three months of the wet season. Females reached sexual maturity at 18 months of age. Males grew faster than females. Minimum longevity in the field was four years for females and six years for males. The population structure was constant at three sites, and the sex ratio exhibited a strong male bias. Density of frillneck lizards in *Eucalyptus* open forest varied from 0.13 to 0.78/ha. Males have larger dry-season home ranges (mean = 1.96 ± 0.57 ha) than females (mean = 0.63 ± 0.12 ha). No seasonal difference was evident in size of home range for either male or female lizards. No correlation was evident between snout-vent length and home range for either sex. This suggests that the home ranges of frillneck lizards were not determined by either food resources or body size but possibly related to social behavior. Arid-adapted agamids exhibit broad similarity in timing of the reproductive season, whereas factors such as growth and age at sexual maturity differ with body size and environmental conditions.

SIZES OF NEONATE NORTHERN WATER SNAKES

P. J. Weatherhead [1999, J. Herpetology 33(4):577-589] notes that the theoretical construct of an optimal offspring size remains widely cited in life history literature, despite the regular failure of the central prediction of that theory, that offspring size should not vary within populations. Here data from 77 litters collected over four years from captive and free-living northern water snakes (*Nerodia sipedon*) were used to test several hypotheses proposed to explain within-population variation in offspring size. Neonate mass varied from 1.5 to 6.1 g. Neonate mass did not increase as a simple function of maternal size, contrary to the hypothesis that maternal body size physically constrains offspring size. Holding litter size constant, larger females and females in better condition produced larger offspring. The variance in neonate size greatly exceeded the maximum that could be accounted for by the fractional-offspring hypothesis. The authors found some evidence that females that acquire food during the protracted period of follicular enlargement can invest that energy into those follicles, and thus increase offspring size. They found no evidence that embryos trade off condition with body size when they are born earlier. The strongest correlate of offspring size was litter size: offspring were smaller in larger litters. Because larger litters were born earlier, the authors propose that large females (i.e., those producing large litters) may have an energetic advantage that allows them to ovulate earlier. If early birth increases neonate fitness, then a small offspring born early may have the same fitness as a larger offspring born later, thereby allowing larger females to trade off offspring size against offspring number. Collectively, these results suggest that offspring size in northern water snakes varies as a consequence of constraints imposed by reproductive physiology, and potentially by adaptive maternal manipulation of offspring size. Understanding why offspring size varies is more likely to be advanced by an approach that incorporates both these types of factors, while discarding the construct of optimal offspring size.

NEW SPECIES OF PARACHUTE GECKO

R. M. Brown [1999, Copeia (4):990-1001] describes *Ptychozoon trinotaterra*, a new species of parachute gecko from localities in northeastern Thailand and the central highlands of Vietnam. The new species is known from intact climax rain forest and slightly disturbed clearings or secondary forest adjacent to intact rain forest. The new species differs from congeners by the combination of three (vs. four) transverse bands in the axilla-groin region, 19–21 preanofemoral pore-bearing scales in a continuous series, 15–16 cutaneous denticulate lobes of the tail, lateral orientation of the caudal lobes, minimal reduction in total width of distal portions of the tail, absence of substantive lateral expansion of the straight-edged tail terminus beyond the nearest denticulate caudal lobe, minimal lobe fusion at the proximal border of the tail terminus, continuation of caudal tubercles distally on to the dorsal surface of tail terminus, absence of a predigital notch in the preantibrachial cutaneous expansion, and the presence (in a Thai specimen) of a midvertebral row of flat dorsal tubercles (vertebral tubercle series absent in Vietnamese specimens).

ORIGINS OF THE FROG-KICK

A. Abourachid and D. M. Green [1999, J. Herpetology 33(4): 657-663] note that when swimming, as when jumping, frogs typically kick synchronously and symmetrically with both hind legs. This is an evolutionarily derived, drag-based mechanism employing the feet as paddles and the hind limbs as thrusters. But morphologically archaic frogs of the genera *Leiopelma* and *Ascaphus*, although they jump when on land, obligately swim using alternating leg movements. The authors video-recorded swimming *Leiopelma hochstetteri*, *L. archeyi*, and *Ascaphus truei*, and other frogs. *Leiopelma* spp. and *Ascaphus* always swam with alternating movements of their hind limbs, holding their forelimbs forward and outstretched. One leg always trailed the body acting as a rudder reducing yaw. The frogs swam with near constant velocity and, like swimming tadpoles, the body swung from side to side, pivoting at the level of the otic region. All other species swam with simultaneous and symmetrical movements of the hind limbs, without lateral movement, and with forelimbs pulled back to lie alongside the body; asynchronous leg movements were associated only with mid-water directional changes. The locomotor behavior of *Leiopelma* and *Ascaphus* demonstrates that frog jumping and frog swimming are independent locomotor modes with separate evolutionary derivations and neural controls. Therefore, even though the earliest known anurans may have jumped like frogs it does not follow that they swam like frogs.

SEXUAL DIMORPHISM IN PRAIRIE RATTLESNAKE LUNGS

J. S. Keogh and V. Wallach [1999, Amphibia-Reptilia 20(4): 377-389] quantified sexual dimorphism and allometric changes in the lung morphology of 160 juvenile and adult specimens of prairie rattlesnakes, *Crotalus viridis viridis*, from a single population. In virtually all lung components, those of males are located more posteriorly than are those of females of the same body size. Males display a longer vascular component than females but there is no sexual dimorphism in size of the avascular component. Thus, males generally have longer lungs than do females at all body sizes. With increasing body size, the lung components are found more anteriorly, relative length of the vascular lung decreases, and relative length of the avascular lung increases in both sexes. However, total lung length increases isometrically with body size. These sexual and allometric differences suggest that intraspecific variation should be taken into account when lung size characters are used in snake systematic studies.

DO BOOID SNAKES STAB THEIR PREY?

A. Deufel and D. Cundall [1999, Copeia (4):1102-1107] find that measurements of anterior maxillary tooth form combined with video analysis of predatory strikes show that booid snakes do not stab their teeth into prey as has been previously proposed. The recurved shape of the teeth combined with the direction of travel of the upper jaw at prey contact cause the teeth to slide over the prey. Maxillary tooth penetration normally occurs as the prey recoils against the tooth tips. Snaring is a better descriptor of maxillary tooth function in booids.

MILOS VIPER ECOLOGY AND CONSERVATION

G. Nilson et al. [1999, *Amphibia-Reptilia* 20(4):355-375] found that the Milos viper (*Macrovipera schweizeri*) is nocturnal from early summer until mid-September. The typical habitat was maquis terrain with small and large bushes on gravel or rocky ground. Telemetric studies showed cryptic basking behavior during 23.5% of the localizations, and a preference for large bushes (77.7%). The mean distance moved between two succeeding days was 28.5 m (with s_x of 47.9), and in general, the male home range covered an area of 10 to 20 ha, while the female home range was smaller. Hibernacula were south-facing and situated in the middle of the home ranges. Population density was 50 adult vipers per km² in the optimal habitats. The total population for western Milos was estimated to be around 2,500 adult vipers during the study period (1993–98). The present total population on Milos seems to be below 3,000 adult animals. The species has been isolated since the Pliocene, and adapted to a diet of passerine birds. A pattern of twice-a-year foraging during spring and autumn bird migrations was highlighted. During spring, the vipers tend to be concentrated around water pools; in the dry autumn nights they climb up trees for resting birds. In years with a cold spring or autumn, critical situations may occur with starvation, resulting in cyclic population patterns. Mid-May is the mating period. The female reproductive cycle is biennial. The sex ratio is nearly 1:1. Around 600 specimens reach adulthood and participate in the reproductive activities each year. Mining and fires destroy habitat. The yearly estimated removal by man and road killing of vipers is up to 500–600 adult specimens. Thus, the input and out-take of adult specimens is of the same magnitude, and equal to a yearly 25% turnover. This indicates a very delicate balance, and even a small change that increases the removed number can lead towards a rapid extraction. A conservation program is urgently needed and should include the establishment of protected areas, the closing of roads for nighttime driving, and prohibition of increased mining activities.

CLOACAL POPPING IN SNAKES

B. A. Young et al. [1999, *J. Herpetology* 33(4):557-566] note that tactile stimulation to the Sonoran coral snake (*Micruroides euryxanthus*) and the western hook-nosed snake (*Gyalopion canum*) induces an expulsion of air from the cloacal vent that results in an audible popping sound. The behavioral context of cloacal popping differs in these two species, as does the acoustics of the popping sound. The cloacal pops produced by *M. euryxanthus* are rather consistent and show a low amplitude (50–53.5 dB), limited frequency range (442–5523 Hz), distinct temporal patterning, and harmonics. The cloacal pops released by *G. canum* are more variable; the initial pops are of high amplitude (70–73 dB) and broad frequency range (359–15,178 Hz), but in subsequent pops the amplitude falls off and the frequency range narrows; no temporal patterning or harmonics were observed. Cloacal popping is driven primarily by the M. Sphincter cloacae but may involve other extrinsic cloacal musculature. The presence of this unusual defensive sound in only these two sympatric snakes suggests its function against a common predator.

PARENTAL CARE IN THE SPOTTED POISON FROG

J. P. Caldwell and V. R. L. de Oliveira [1999, *Copeia* (3): 565-575] studied the spotted poison frog, *Dendrobates vanzolinii*, in Amazonian rain forest in Brazil. They found that these frogs form pair-bonds. Pairs of frogs cooperate to provide care for their offspring. Observations of naturally marked pairs revealed that one to several eggs are attached above the waterline in tiny water-filled cavities, typically in saplings or woody vines in the forest understory; after an egg hatches, the male transports the tadpole on his back to a different cavity where it undergoes further development in a small amount of water. Tadpoles of *D. vanzolinii*, as well as those of other species of *Dendrobates*, are predatory and cannibalistic; eggs deposited above the waterline in a cavity are not allowed to drop in the water below where a larger, cannibalistic tadpole may be present. The male parent always transports tadpoles in this species and chooses the tadpole deposition sites. The tiny holes in vines or saplings contain only a small amount of water and lack food resources for the tadpole. Typically, unfertilized (nutritive) eggs deposited by the female parent are the tadpoles' only food. Both parents have a role in this form of biparental care: the male guides the female to the deposition site housing the tadpole where they undergo courtship behavior, which appears to be necessary to induce ovulation in the female. Males are territorial, and no males were seen entering another male's territory. Females remained in their mate's territory and were not seen to interact with other frogs. Large treeholes and other potential tadpole deposition sites are scarce in this area of Amazon forest, but tiny vine and sapling holes are common. Lack of food resources in these holes and the avoidance of tadpole cannibalism are potential determinants of biparental care in this species. Additional work on biparental care of this and closely related species should focus on the significance of size of deposition cavities, the role of tadpole deposition patterns, the extent of cannibalism, and other aspects of tadpole behavior and ecology unique to these species.

EVOLUTION OF HERBIVORY IN LACERTIDS

R. Van Damme [1999, *J. Herpetology* 33(4):663-674] tested for correlation between insularity and herbivory in lacertid lizards. Analysis of literature data on 97 populations of 52 species shows that lizard populations on islands more often include plant material in their diet than do mainland populations. To investigate whether this reflects adaptation due to recent selection or is merely a product of the phylogenetic history of the populations, the author reconstructed the ancestral states for diets and insularity and incorporated them in the analysis. Changes in habitat (island–mainland or mainland–island) often went with changes in diet (herbivore–insectivore or insectivore–omnivore). Insectivorous lizards that find themselves on islands more often turn towards herbivory than do lizards living in mainland situations. Lizards that already have plants in their diet when living on the mainland seem more successful in colonizing islands. Herbivorous populations of lacertids tend to be larger than insectivorous populations, but there is considerable overlap. No difference in mean snout–vent length was found between island and mainland populations.

Unofficial Minutes of the CHS Board Meeting, December 10, 1999

The meeting was called to order at 7:38 P.M. Board members Greg Brim, Gino Martinez, Jenny Picciola, Marcia Rybak and Don Wheeler were absent.

Officers' and Committee Reports

The minutes of the November Board of Directors meeting were read, corrected and accepted.

The Treasurer's report was accepted. Gary Fogel opined that the CHS needs to increase membership and develop sponsorships for ReptileFest to avoid going in the red next year.

Membership was reported at approximately 835.

Shows: Jenny Vollman reported that no shows are planned until the Chicago Family Pet Show at Arlington Park in March.

Raffle: Marcia Rybak sent Christmas cards to the various raffle donors on behalf of the CHS.

ReptileFest: Lori King reported that the contract with North-eastern Illinois University for the coming year's 'Fest has finally been signed. There will be an added fee for tables and chairs because they are no longer being stored in the building in which the event is to be held. Marcia Rybak is developing a ReptileFest page for the CHS website. Vendors will be able to register on-line.

Sergeant-at-arms Greg Brim has this year's award plaques in his possession. They will be presented at the December general meeting.

President Jack Schoenfelder thanked the 1999 nominating committee for its efforts. He has appointed Ron Humbert to chair next year's nominating committee. Joan Moore will also be a member of next year's committee.

Symposium 2001: Char Haguewood will be at the December general meeting to briefly discuss planning for the 2001 Midwest Herp Symposium. The first committee meeting is to be held at Mike Dloogatch's office on January 15.

Old Business

Jack Schoenfelder reported progress in negotiations with the Chicago Academy of Sciences. CHS general meetings may be held at the Peggy Notebaert Nature Museum beginning in March if all goes as planned.

Corresponding Secretary Lori King has written a letter to Nieman Marcus on behalf of the CHS, protesting their catalog promotion of a chair covered in saltwater crocodile hide (with hunting and shooting the croc to be part of the deal).

New Business

Mike Dloogatch moved to allocate \$2000 for CHS Herpetological Grants for the year 2000. The vote was unanimous in favor. Lori King, Marcia Rybak and Mike Dloogatch will be on the 2000 Grants Committee.

Jack Schoenfelder reported that *Reptiles* Magazine interviewed

him on what's involved in running a regional herp society.

The welcoming format for new members was discussed.

Steve Spitzer reported that the Chicago Turtle Club would be willing to organize the CHS Picnic for the coming year, as they did in 1999.

Round Table

Lori King and several other CHS members attended the Project Exploration "Dinner with a Dinosaur" gala at Navy Pier. The meeting adjourned at 9:15 P.M.

Respectfully submitted by Recording Secretary Karen Bielski

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Visit the CHS Website at
<http://www.chicagoherp.org>

It's where to find:

- Herpetological headlines
- Herps of Illinois, with photos
- Calendar of events
- Society information (membership, bylaws, back issues of the *Bulletin*)
- Contact information for board members and committees
- Book reviews
- Photos
- Grant awards
- Links to other herp sites

Advertisements

American Federation of Herpetoculturists: A nonprofit national membership organization of herpetoculturists, veterinarians, academicians and zoo personnel involved in the captive husbandry and propagation of amphibians and reptiles. Membership includes highly acclaimed magazine, *The Vivarium*, dedicated to dissemination of information on herpetocultural accomplishments, herp medicine, breeding and maintenance, field studies and adventures, enclosure design and much more. AFH membership is \$26. Send information requests to: AFH-News, P.O. Box 300067, Escondido CA 92030-0067.

For sale: rats and mice—pinkies, fuzzies and adults. Quantity discounts. Please send a SASE for pricelist or call Bill Brant, *THE GOURMET RODENT*, 6115 SW 137th Avenue, Archer FL 32618, (352) 495-9024, E-mail: GrmtRodent@aol.com.

For sale: murine-pathogen-free rats and mice available in all sizes, live or frozen: pinkies, fuzzies, crawlers, small, medium and large. Frozen crawler mice in lots of 2000, \$.17 each. Also available, full grown hairless mice. FOB shipping point. Master Card accepted. Call (518) 537-2000 between 8:00 A.M. and 5:00 P.M. or write SAS Corporation, 273 Hover Avenue, Germantown NY 12526 for prices and additional information.

For sale: from **The Mouse Factory**, producing superior quality, frozen feeder mice and rats. New prices, new sizes, and now rats! Our mice and rats are vacuum-packed to greatly extend freezer life by reducing freezer burning and preserving vitamin and nutrient content. We feed our colony a nutritionally balanced diet of rodent chow, formulated especially for us, and four types of natural whole grains and seeds. Mice: pinkies, \$.25; fuzzies, \$.30; hoppers, \$.35; weanling, \$.40; adult, \$.45. Rats: starting with pinks at \$.40 each, to XL at \$1.80 each. Discount prices available. We accept Visa, MC, Discover or money orders. P.O. Box 85, Alpine TX 79831. Call us toll-free at (800) 720-0076 or visit our website: <http://www.themousefactory.com>.

For sale: from Bayou Rodents, excellent quality feeder mice and rats. Every size available. Pinks starting at \$20/100. Orders are shipped by overnight service Monday thru Thursday. We accept Visa, MasterCard and Discover. For more info, contact Rhonda or Peggy, (800) 722-6102.

For sale: **high quality frozen feeders**. Over a decade of production and supply. Seven sizes of mice available: small newborn pinks up to jumbo adults. Prices start at \$25 per 100. Feeders are separate in the resealable bag, not frozen together. Low shipping rates. Free price list. Kelly Haller, 4236 SE 25th Street, Topeka KS 66605, (913) 234-3358 evenings and weekends.

For sale: Herp bags—colors vary, translucent ripcord nylon, super lightweight, extremely durable construction with hot corners sewn in, double seamed. Custom sizes made upon request. Sizes: 46" × 14", \$7 each; 24" × 12", \$6 each; 24" × 6", \$5 each. Shipping fees, \$1 for first bag, \$.30 each additional bag. Nicole Lechowicz, 2511 S. Illinois Avenue, #104, Carbondale IL 62901, (618) 457-2783.

For sale: a variety of used books on herpetology and other natural history topics. Most are out-of-print; some are signed by the author. Included: Carr, *The Reptiles* (1963), \$15; Cochran, *New Field Book of Reptiles and Amphibians* (1970), \$10; Ditmars, *The Reptiles of North America* (1936), \$50; Minton, *Amphibians and Reptiles of Indiana* (1972), \$50 (signed by the author); and Pinney, *The Snake Book* (1981), \$20. Add \$3 shipping and handling for the first book, \$2 for each additional book. Send SASE for complete list to John Cebula, 606 High Road, Glen Ellyn IL 60137.

For sale: breeding pair of bearded dragons, \$150/pair (\$80 each); juvenile male bearded dragon, \$35; breeding colony of leopard geckos (two males, five females), \$300 (prices vary on individuals); 11 juvenile leopard geckos, \$18 each (four/\$60); male banded gecko, \$10; juvenile amelanistic corn snakes, \$15 each. John, (630) 858-3767.

For sale: **Captive-bred *Uromastix ornatus* and *Uromastix acanthinurus***—*U. ornatus*, \$400; *U. acanthinurus*, \$200—all F offspring, gorgeous, healthy babies from c.b. parents. My third season producing these jewels. Also, c.b. high yellow leopard gecko babies, \$20; one male and one female c.b. leucistic leopard geckos (Rainwater bloodline), \$100/pair. Audrey Vanderlinden at **Uromastix Specialties**, (773) 836-2477 or E-mail: uromastica@aol.com.

For sale: two males and one female **double het snow plains garters (*T. radix*)**, carry genes for albino, anerythristic and snow—female has slight stumped tail; two possible het snow plains—these are offspring of double het breeding, 66% chance of being het. All eat pinks and are eating like pigs. One **adult male double het snow plains garter**, eats adult mice. \$600 for group or \$300 excludes adult, plus shipping. All are healthy and mite-free. Scott, (919) 934-0110 EST. [NC]

For sale: Great snakes, great service. Send SASE for list. Applegate, P.O. Box 338, Campo CA 91906, (619) 478-5123. E-mail: applesnake@juno.com. Website: <http://www.applegatereptiles.com>. Thank you, call me.

For sale: one male and one female womas, proven breeders with CITES documents, ready to cycle (end of November) and at an excellent price. Dick Goergen, (716) 681-4518, or leave message at (716) 481-0216. [Buffalo NY]

For sale: Brazilian rainbow boas, c.b. 9/99 from beautiful red parents w/ orange half-moons, \$125 each; Mexican rosy boas, cream w/ brown striping, \$50 each; Macklot's pythons, pair of flawless hatchlings, \$175/pair; black & white banded Cal. kings, \$25–35. Mark, Strictly Serpents, (847) 854-3259.

For sale: Send SASE to CRC, P.O. Box 0731, Las Vegas NV 89125-0731 for brochures and list of species available. Limited bookings available for guided tours of herpetological collection sites in Nevada. Call/fax (702) 450-0065. URL <http://www.herp.com/crc/> E-mail: crcsafetie@aol.com.

Tours: Adventure tours to Madagascar! Join **Bill Love** seeing and photographing fauna and flora, heavily herp-biased, across the world's least known mini-continent. Maximum fun & photo ops assured on every trip. Contact him at: BLUE CHAMELEON VENTURES, P.O. Box 643, Alva FL 33920. TEL: (941) 728-2390, FAX: (941) 728-3276, E-mail: blove@cyberstreet.com.

Tours: **Road-riding in Costa Rica!** Treat yourself to the trip of a lifetime! Learn about tropical herps, find them, photograph them, see where they live. **Greentracks, Inc.**, offers the best herpetological tours led by internationally acclaimed herpetologists and herpetoculturists. See the Amazon, visit cloud forests, experience the world's greatest rainforest, super sunsets and good company. Call (800) 9-MONKEY.

Wanted: Mindanao water monitors, *Varanus salvator cumingi*, for research and breeding projects. Bob, (719) 964-3779. [NV]

Wanted: I am interested in acquiring information on egg sizes of lizards and turtles/tortoises—especially herbivores. If you have measurements of female body size (SVL; TL, or mass before or after parturition), length and width, or mass of eggs at the time of deposition, or body masses of hatchlings, I would appreciate very much hearing from you. Robert Espinoza, Dept. of Biology, MS 314, Univ. Nevada, Reno, NV 89557, E-mail: espin_r@unr.edu.

Wanted: big-headed turtles; mata mata turtles; Mexican giant mud turtles (*Staurotypus triporcatus*); exceptionally large common snappers (45 lbs. & up); large alligator snappers (over 90 lbs.); spectacled caiman from Trinidad, Tobago and Surinam; dwarf caiman; smooth-fronted caiman; albino turtles (except red-eared sliders). Walt Loose, (610) 926-6028, 9:00 A.M. – 1:00 P.M. or after 11:30 P.M. Eastern Time.

Line ads in this publication are run free for CHS members — \$2 per line for nonmembers. Any ad may be refused at the discretion of the Editor. Submit ads to: Michael Dloogatch, 6048 N. Lawndale Avenue, Chicago IL 60659, (773) 588-0728 evening telephone, (312) 782-2868 fax, E-mail: <MADadder0@aol.com>.

**Chicago Herpetological Society
Statement of Income and Expense**

	1999		1998	
	INCOME	EXPENSE	INCOME	EXPENSE
Membership	16,189.70	650.66	23,880.60	1147.86
Telephone		569.67		523.91
Miscellaneous Postage		65.00		128.00
Monthly Programs		1811.54		2,580.55
Supplies and Equipment		24.00		410.59
Books and Merchandise	126.42		1,917.97	2,644.50
Bulletin: Printing & Postage		16,731.22		16,762.34
Back Issues	23.00		39.50	
Advertising	779.00		1,199.00	
Raffle	740.50		676.50	
General Meetings		1,920.00		1,920.00
CHS ReptileFest	11,202.00	11,061.28	15,780.00	9,884.86
Zoo Field Trips	1,488.40	1,450.00	1,665.00	1,665.62
Workshops	100.00			
Shows		444.25	.18	813.00
Grants		2,261.75		2,000.00
Donations	179.00	208.00	450.00	600.00
Refreshments/Picnic		72.72	60.00	98.00
Library		30.00		
Miscellaneous		182.53		129.00
Interest	2,528.21		2,434.74	
Insurance		979.00		978.00
Awards		126.19		351.96
Sale of Book Inventory			3,000.00	
	33,356.23	38,587.81	51,103.49	42,638.19

Cash as of 31 December 1998	\$59,724.66
1999 Income – 1999 Expense	(5,231.58)
Illinois sales tax collected in 1999	10.68
Illinois sales tax paid to state in 1999	(11.00)
Cash as of 31 December 1999	\$54,492.76

News and Announcements

2000 CHS HERPETOLOGICAL GRANTS PROGRAM

The Chicago Herpetological Society announces the 2000 CHS Herpetological Grants Program to award financial support for herpetological research, education and conservation. Several awards of up to \$500 each will be available. Interested parties may apply for a grant in any one of the following categories:

1. Illinois Herpetology
2. Graduate Student Research in Herpetology
3. Undergraduate Research in Herpetology
4. Field Studies in Herpetology
5. Conservation
6. Captive Management, Husbandry, and Propagation

An attempt will be made to award grants in each category, but depending on the application received, not all categories may receive awards. Some categories may receive more than one award. The Grants Committee reserves the right to reassign the category under which a given proposal is submitted.

Applicants must be members of the Chicago Herpetological Society. In accepting a grant, the recipient agrees to abide by all state and federal laws, to submit a written summary of the project for publication in the CHS *Bulletin*, and to acknowledge the Chicago Herpetological Society in any publications that result from the subsidized research. Recipients are encouraged to submit their work as an article for the CHS *Bulletin*, or to present a program at a CHS general meeting.

Applications should include the following:

1. Statement of the objectives of the proposal.
2. Description of materials and methods.
3. Complete budget, not to exceed \$500.
4. Brief resumé of the applicant, if an individual. If the applicant is an organization, background information on that organization should be included.
5. A completion date for the project.

Applications must be typed, double spaced, and submitted in duplicate. Applications should be kept brief and simple, and proposals longer than three to five pages are discouraged. All applications must be received by 1 April 2000, and awards will be announced by 1 May 2000.

It is the goal of the Grants Committee to award grants to a variety of applicants; enthusiastic amateurs will receive equal consideration with professional herpetologists and graduate students. Topics which might translate into quality CHS *Bulletin* articles or monthly meeting programs are favored, though not requisite.

Submit applications to: Chicago Herpetological Society, Grants Program, 2060 N. Clark Street, Chicago IL 60614. Questions should be directed to Marcia Rybak, (310) 456-8332, or Webmaster@ChicagoHerp.com.

AWARDS PRESENTATION

Each year the Chicago Herpetological Society bestows awards upon a few select members in recognition of their service to the organization. At the December 29 meeting two awards were presented. **Marcia Rybak** received the CHS Merit Award. This honor is given each year to one or more individuals selected by the Awards Committee for outstanding service. **Gary Kostka** received the Presidential Service Award, presented each year to a person selected by the president as having been particularly helpful to the president or to the CHS Board.

MOVING??

Please let us know in plenty of time of any change in your mailing address. The *Bulletin of the Chicago Herpetological Society* is sent to our U.S. members by bulk-rate third class mail. This means that the U.S. Post Office will not forward your *Bulletin* with the rest of your mail. This is so even if you make a special request that your magazines be forwarded (such a request only applies to second class mail).

UPCOMING MEETINGS

The next meeting of the Chicago Herpetological Society will be held at 7:30 P.M., Wednesday, January 26, at the Field Museum of Natural History, Roosevelt Road at Lake Shore Drive, in Chicago. The featured speaker at this meeting will be **Stephen L. Barten, D.V.M.**, of the Vernon Hills Animal Hospital. Dr. Barten's topic will be "Reptile Medicine and Surgery: Unusual Cases, Unusual Critters." He will present a variety of interesting cases to demonstrate the many diseases from which reptiles suffer, why a scientific approach is necessary to make a diagnosis, and why an accurate diagnosis is necessary to prescribe an effective treatment.

Alan Kardon, curator of the reptile, amphibian and aquarium department at the San Antonio Zoo, will speak on "Herping in Mexico — A 21-year Adventure" at the February 23 meeting.

We are required to use the entrance on the west side of the museum. **We are allowed to use the free parking lot to the west of the museum. Entrance to this lot is from McFetridge Drive, the wide street just to the south, between the museum and Soldier Field.** Public transportation is an option: the Roosevelt Road (12th Street) bus goes directly to the museum, thus providing a connection with the el and subway. This bus service runs until 11 P.M.

The Chicago Turtle Club

Chicago Turtle Club meeting dates have been changed to the last Sunday of the month. The next meeting will be on Sunday, January 30, 1:00 – 3:30/4:00 P.M., at the North Park Village Nature Center, 5801 N. Pulaski, in Chicago. Meetings are informal. Questions, children and animals are welcome. Parking is free. For more info call Lisa Koester, (773) 508-0034 or visit the CTC website: <http://www.geocities.com/~chicagoturtle>.

NEW MEETING SITE STARTING IN MARCH

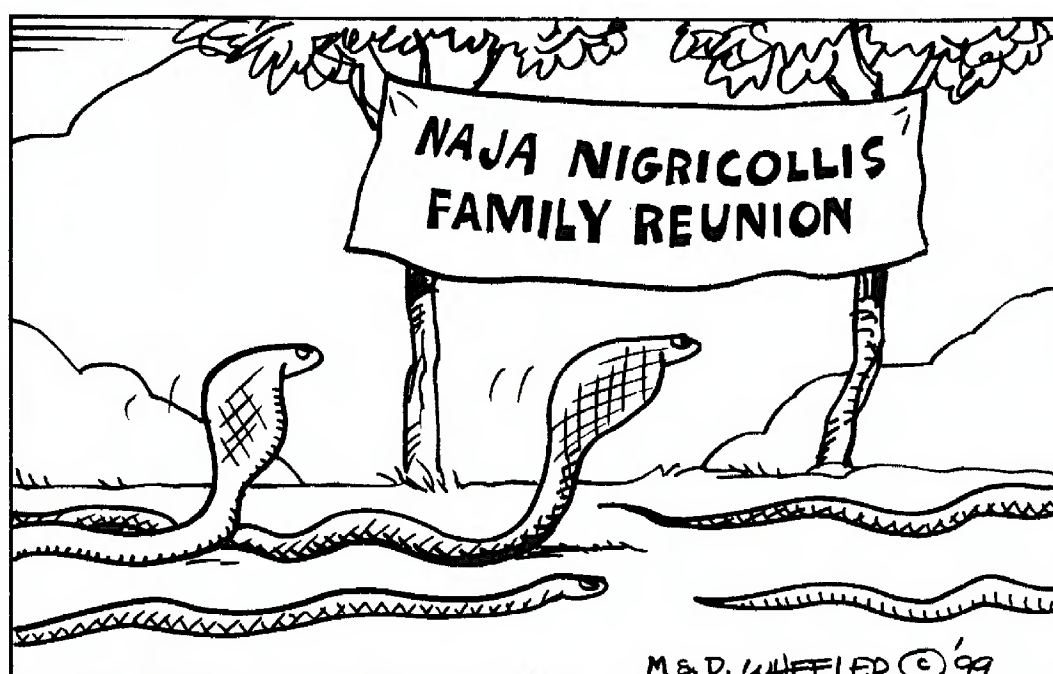
Beginning March 29 the regular monthly meetings of the Chicago Herpetological Society will take place at Chicago's newest museum — the **Peggy Notebaert Nature Museum**. This beautiful new building is at Fullerton Parkway and Cannon Drive, directly across Fullerton from the Lincoln Park Zoo. Meeting dates will continue to be the last Wednesday of each month. Meetings will start a half-hour earlier — 7:00 P.M. — and will last until 9:30 P.M. Free parking is available on Cannon Drive and also across Fullerton in the Lincoln Park Zoo lots. A plethora of CTA buses stop within easy walking distance. March 29 will be a very special meeting — please plan on joining us.

DONATIONS TO THE NOVEMBER 24 RAFFLE

The following is a listing of those businesses and individuals who generously donated items for our monthly raffle at the November 24 meeting. The donated items are shown in parentheses.

Aquarium Systems (Sea Test hydrometer); Top Hat Cricket Farm (cricket watering station); Energy Savers Unlimited (Bright Light herp light); Hagen (OrnamentAlls cholla cactus half / Reptipor odor remover / Rept-o-Meter hygrometer / Prime vitamin supplement); Rep-Cal (bearded dragon food); Rainbow Mealworms (mealworm gift certificate); Fancy Publications (*Reptiles* magazines); Absorption Corp. (Carefresh pet bedding); Ghann's Cricket Farm (cricket gift certificate) Pretty Pets (iguana food); ZooMed (Dr. Turtle sulfa block / *ReptiMania* herp book); Four Paws (reptile claw clipper); Super Pet (Hanging Gardens cage decor / ceramic dishes / Floating Island); Reptile Emporium (InsectNside candy / Larvets Worm Snax); Gary Fogel (crocodile figures / lizard squeaky toy); Lori King (turtle candle holder); Jack Schoenfelder — Reptiques (aquariums and stand); Marcia Rybak (T-shirt / lizard bottle opener).

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